

RESEARCH PAPER

Preliminary studies on bioactive components of *Dendrobium* species found in Manipur

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Northeast India harbors rich diversity of orchid species under the family Orchidaceae. This may be attributed to the climatic and topographic conditions favorable for the growth of orchids. Manipur is also a home to 66 genera of orchids belonging to the family Orchidaceae. Of these, around 50 species belongs to the genus *Dendrobium*. *Dendrobium* species is a rich source of many bioactive components like alkaloids, flavonoids, stilbenoids, phenanthrene, polysaccharides etc. which can be used for many therapeutic purposes. Little or less work has been done on the quality and quantity assessment of these bioactive components of the *Dendrobium* species found in Manipur. Therefore, this study focuses on the morphological studies and screening of the bioactive components of ten *Dendrobium* species found in Manipur.

Key words : Orchidaceae, *Dendrobium* species, Bioactive component, Manipur

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INTRODUCTION

The orchids with their 22,000 to 35,000 species in some 700 to 800 genera constitute one of the largest family among the angiosperms (Bose and Bhattacharjee, 1980). India is a home to about 1,300 species of orchids, of which North Eastern India harbors about 800 species. Manipur is reported to have 251 species in 66 genera (Nagaraju *et al.*, 2006). Among the orchids, *Dendrobium* species represent the second largest genera of the family Orchidaceae distributed in India, Burma, Malaysia, Australia, New Zealand, China and Japan (Bose and Bhattacharjee, 1980). Around 311 orchid species are conserved in Manipur out of which around 50 species belong to *Dendrobium* (Orchid Preservation Centre, Khongampat, Forest Dept., Govt. of Manipur, 2015). *Dendrobium* species are either epiphytic, or occasionally lithophytic. Most species of *Dendrobium* are found to

grow in relatively high and mountainous areas, at 1400-1600 metre above the sea level. They grow best at a mild temperature, humid and foggy environment (Singh and Duggal, 2009). *Dendrobium* has useful therapeutic activities like antioxidant, antitumor, anti-hyperglycemic, anti-inflammatory and antimicrobial activities (Yang *et al.*, 2006; Zhao *et al.*, 2007 and Devi *et al.*, 2009). They have been reported to contain alkaloids, bibenzyl, stilbenoids, phenanthrenes, polysaccharides, etc. which are of therapeutic importance (Fan *et al.*, 2001; Zhao *et al.*, 2007 and Ito *et al.*, 2010). The parts of the orchids most frequently used are the stems and pseudo-bulbs, which are rich in nutritive substances and help the plant to survive during winter. Since time immemorial, in Chinese medicine *Dendrobium* species has been used in treating various ailments owing to their therapeutic properties. However, this property has been least known

even though there is high diversity of *Dendrobium* species in Manipur. In the present paper, preliminary studies were conducted regarding the *Dendrobium* species found in Manipur.

The present study includes 10 (ten) *Dendrobium* species of Manipur i.e., *Dendrobium aphyllum*, *Dendrobium chrysanthum*, *Dendrobium chrysotoxum*, *Dendrobium crepidatum*, *Dendrobium densiflorum*, *Dendrobium devonianum*, *Dendrobium fimbriatum* var. *oculatum*, *Dendrobium moschatum*, *Dendrobium nobile* and *Dendrobium wardianum*.

RESEARCH METHODOLOGY

Morphological studies :

Dendrobium species were collected from various districts of Manipur during March to July, 2015. Morphological studies were conducted with reference to their leaf, stem, pseudo-bulb and the flowering of these *Dendrobium* species. The specimens were further identified following taxonomic standard books (Bose and Bhattacharjee 1980 and Bechtel *et al.*, 1981). Confirmation of the taxonomic studies will be done at the molecular level.

Phytochemical screening :

Extraction :

The stem or the pseudo-bulb were thoroughly washed and sliced after that it was air dried. The air dried materials were made into powdered form. The powdered sample of *Dendrobium* species were subjected for extraction with ethanol using a Soxhlet apparatus. The extracts were dried and kept in an airtight container and stored in a refrigerator at 4°C for further analysis. The preliminary phytochemical screening was carried out by following the procedures of Kokate, 1993.

Test for alkaloids :

A small portion of the extract is stirred with few drops of 1 per cent Hydrochloric acid and filtered. The filtrate is treated with Wagner's reagent. Reddish brown precipitate indicates the presence of alkaloids.

Test for saponins :

One ml of the extract is diluted with 20 ml of distilled water and shaken vigorously for 15 minutes. Formation of stable foam indicates the presence of saponin.

Test for tannins :

Development of blue green colour in the extracts when treated with ferric chloride indicates the presence of tannins.

Test for phenols :

Small quantity of the extract is diluted with 5 per cent ferric chloride solution. Development of intense colour indicates the presence of phenols.

Test for terpenoids :

Three drops of chloroform and two drops of concentrated sulphuric acid were added to the extract. Appearance of yellow colour in the lower portion indicates the presence of terpenoids.

Test for flavonoids :

The extract is treated with few drops of 5 per cent ferric chloride. The appearance of blackish green colour indicates the presence of flavonoids.

RESEARCH FINDINGS AND ANALYSIS

Morphological characteristics of the ten species are indicated as follows:

Dendrobium aphyllum Roxb. C.E. Fischr :

Dendrobium aphyllum have stem which are more or less 60-90 cm in length, slender, 6-10 cm thick. Leaves 5-12 cm long, 2-3 cm broad, deciduous. Flowers 2-3, on short peduncle from the node, borne on old stems; sepals and petals white or pale rose; lip tubular at base lined with purple vein.

Dendrobium chrysanthum Wall. and Lindl :

Stem of *Dendrobium chrysanthum* are usually 1-2 m long, flowering while leafy. Leaves 10-21 cm long, 1-3.5 cm broad, deciduous. Flowers 1-3, given off opposite the leaves; sepals and petals golden yellow; lip with two basal round chestnut patches.

Dendrobium chrysotoxum Lindley :

Dendrobium chrysotoxum have pseudo-bulbs with 12-30 cm long, bearing 3-4 leaves towards apex. Leaves 10-15 cm long, 2.5 cm broad. Inflorescence 15-20 cm long, 12-21 flowered; sepals and petals golden yellow; lip thick with a fringed margin.

***Dendrobium crepidatum* Lindley :**

Stem are 15-45 cm long, internodes covered with papery sheaths. Leaves 5-12 cm long, 1-1.5 cm broad. Flowers 1-3 from nodes on leafless stems; sepals and petals white with pink apices; lip roundish with a large yellow spot.

***Dendrobium densiflorum* Lindley and Wall :**

Pseudo-bulbs 30-50 cm tall, 2 cm thick, 3-5 leaved toward apex. Leaves 16 cm long, 2-2.5 cm broad, persistent. Inflorescence arises from sub apical, 20 cm long, densely flowered, sepals and petals yellow. Lip orange with paler edges, margin fimbriate.

***Dendrobium devonianum* Paxton :**

Stem 120 cm long, slender. Leaves 10 cm long, 8 mm broad, deciduous. Flower 1-2 at each nodes of the leafless stem, creamy white with purple margin. Lip heart shaped with two basal yellow patches.

***Dendrobium fimbriatum* var. *oculatum* Hk :**

Stem up to 120 cm long. Leaves 8-15 cm long, 2-3 cm broad, deciduous. Inflorescence 6-15 flowers, up to 18 cm long from apex of leafless stems; sepals and petals light orange-yellow; lip deep orange-yellow.

***Dendrobium moschatum* Wall :**

Stem 150 cm long or more, dark brownish when old, bearing leaves at the apical half. Leaves 15 cm long, 3-4 cm broad, acute. Inflorescence 20 cm long, 8-10 flowered; flower apricot with lilac veins;; lip with 2 large maroon blotches.

***Dendrobium nobile* Lindley :**

Stem 30-50 cm long. Leaves 7-11 cm long, 1-3 cm broad, persistent. Flower 2-4 at each nodes.

***Dendrobium wardianum* Warner :**

Stem up to 120 cm long, 1-2 cm thick. Leaves 8-15 cm long, 1-3 cm broad, deciduous. Flower 1-3 at the nodes on leafless stem; sepals and petals white with purple tips. Lip yellow with 2 deep maroon blotches at the base and purple at the apex.

Table 1 shows the result of phytochemical screening for different *Dendrobium* species considered in this study. The result indicates preliminary chemical analysis which can be useful for phytochemical characterization and confirmation of *Dendrobium* species as well as estimation of bioactive compound. The extracts from *Dendrobium* species revealed the presence of flavonoids, saponins, phenols, alkaloids, tannins and terpenoids compounds which are known to have curative activity against diseases producing pathogen. Therefore, it can be used pharmacologically to develop new compounds for health benefit. Further works on quantification of the bioactive components of these *Dendrobium* species are in progress. Though Manipur has good number of medicinal *Dendrobium* species, many of them are threatened and endangered as a result of various anthropogenic activities. Since they are epiphytic, cutting of host trees can lead to habitat destruction. Even before exploring their medicinal values, many are at the verge of extinction. It is high time we seriously think about conservation of the varieties of different orchids. Further investigation of *Dendrobium*'s therapeutic activities *in vivo* would elucidate its activities as medicinal plant.

Table 1: Qualitative screening of different phytochemicals present in stems of different *Dendrobium* species

Name of the species	Alkaloids	Saponins	Tannins	Phenols	Terpenoids	Flavonoids
<i>Dendrobium aphyllum</i>	+	+	+	+	+	+
<i>Dendrobium chrysanthum</i>	+	+	+	+	+	+
<i>Dendrobium chrysotoxum</i>	+	+	+	+	+	+
<i>Dendrobium crepidatum</i>	+	+	+	+	+	+
<i>Dendrobium densiflorum</i>	+	+	+	+	+	+
<i>Dendrobium devonianum</i>	+	+	+	+	+	+
<i>Dendrobium fimbriatum</i> var. <i>oculatum</i>	+	+	+	+	+	+
<i>Dendrobium moschatum</i>	+	+	+	+	+	+
<i>Dendrobium nobile</i>	+	+	+	+	+	+
<i>Dendrobium wardianum</i>	+	+	+	+	+	+

*+=indicates presence of the respective phytochemical.

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